EEC 485 High Performance Architecture, Fall 2008

Catalog Data: EEC 485 High Performance Architecture (4-0-4). Prerequisite: EEC 483. Architecture of high-speed computer systems with emphasis on design, analysis, and cost-performance ratios, including cache and virtual memory design, pipeline design and control techniques, vector computers, multi-processor computers and parallel algorithms.

Textbook: Computer Organization & Design, by John L. Hennessy and David A. Patterson, 3rd Edition, Morgan Kaufmann Publishers, Inc., 2005.

Coordinator: Dr. Chansu Yu, Associate Professor of Electrical and Computer Engineering
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Class: TR 04:00-06:00 PM, SH325

Office Hour: TR 2:00-4:00 PM or by appointment

Course objectives: To provide a comprehensive overview of the modern microprocessor organization with an emphasis on features for high performance. Topics include including pipeline design and control techniques, cache and virtual memory design, interfacing techniques, multi-processor computers and parallel algorithms.

Expected outcomes: Upon completion of this course, students should be able to (i) understand key ideas and issues regarding pipelining and cache in the design of modern microprocessors, (ii) design a simple microprocessor including datapath, control circuit for controlling datapath, ALU capable of a couple of primitive operations such as addition, subtract, logic and, etc., floating point arithmetic, exception handling, 5-stage pipeline, and cache and (iii) implement the deign using PLA, ROM and microprogramming techniques in combination with the knowledge obtained from other courses such as EEC 380 Digital Systems.

Fulfillment of EE and CE Program Objectives and Outcomes

Objectives

(1) practice computer engineering

(2) define and diagnose problems, and provide and implement computer engineering solutions in an industrial environment

(5) collaborate with others as a member or as a leader in an engineering team

Outcomes

(a) knowledge of mathematics, science, and engineering

(c) ability to design a system, component, or process

(e) ability to identify, formulate, and solve computer engineering problems

(i) recognition of the need for, and an ability to engage in life-long learning

(k) ability to use the techniques, skills, and modern engineering tools

Contribution of Course to Meeting the Professional Component:

Math & Basic Science: 1 credits; Engineering Topics: 3 credits; General Education: 0 credits

Prerequisites by Topic:

1. Digital circuits
2. System programming
3. Assembly program

Course Topics	**Lecture Hours**
1. Introduction to computer organization	4
2. Pipelined architecture	8
3. Hazards and exceptions	8
4. Cache design	8
5. Virtual memory	8
6. Memory hierarchy	4
7. Interfacing processors and peripherals	8
8. Multiprocessors	8
9. Review and Exam	4
	60

Computer Usage: Design and implement cache simulator

Estimated ABET Category Content: Engineering Topics 4 credits or 100%

Grading Policy:		
	Midterm Exam	20%
	Final Exam	30% (Comprehensive)
	Quiz	10% (Many pop quizzes, review & preview)
	Project	30% (2-person project, four sub-parts)
	Homework	10% (5 homework assignments)